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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,462	11/03/2003	Avigdor Huber	2177/41	3503

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EXAMINER	
TAKAOKA, DEAN O	

ART UNIT	PAPER NUMBER
2817	

DATE MAILED: 03/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H-A

Office Action Summary	Application No.	Applicant(s)	
	10/698,462	HUBER ET AL.	
	Examiner	Art Unit	
	Dean O. Takaoka	2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 10-23* is/are rejected.

7)☒ Claim(s) *8 and 9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 November 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/17/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: reference number 72 (Fig. 12b) does not appear to be disclosed in the specification.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 – 6, 10 – 14, 16 – 19 and 21 – 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Goldsmith et al. (U.S. Patent No. 5,619,061).

Claim 1:

Goldsmith et al. (best shown in Figs. 29a-h) shows an RF switch comprising a non-conducting substrate (unlabeled shown in Fig. 29d and analogous to Si substrate 2202 shown in Fig. 22; col. 14, line 17) having two RF traces (in/out) separated by a first gap (microstrips in and out separated by two gaps – Fig. 29b), and at least one ground trace (2940 or 2941 – Figs. 29c, d) coplanar with the RF traces (Fig. 29d) and separated from the RF traces by a second gap (where the spacing between grounds 2940 and 2941 comprises the second gap); at least one membrane (2932) positioned in parallel (i.e. shunt switch – col. 13, line 50) and connected with the substrate (thru vias and ground), the at least one membrane configured to electrically bridge across at least one on the gaps, the membrane deflectable in a membrane mode (analogous to the embodiment shown in Figs. 8a, b); and an electrical mechanism (DC Ctl – Fig. 29c) for moving the at least one membrane between two switching configurations (on/off), a first switching configuration in which the at least one membrane bridges electrically at least one of the gaps (i.e. between the in/out transmission lines) and a second switching configuration which the at least one membrane leaves each of the gaps electrically open (e.g. off).

Claim 2:

Where the configuration of the at least one membrane to electrically bridge is effected by the membrane being electrically conductive (i.e. DC Ctl – col. 13, lines 65-67).

Claim 3:

Where the configuration of the at least one membrane to electrically bridge is effected by the membrane having disposed a conductive bridge (metal membrane 2932 and further inherent by the applied DC voltage).

Claims 4 and 5:

Where the at least one membrane is made of conducting silicon (Si nitride – col. 5, lines 32-34, similar to the Applicant's membrane material, and where Figs. 4b and 10 show additional conductive materials disposed on the membrane and where Fig. 16 shows a bi-material membrane, thus inherently conductive).

Claim 6:

Where the electrical mechanism includes thin-film electrodes operative to interact electrostatically to move the membrane in the deflection mode (where electrodes in 29b are analogous to electrodes 405, 406, 415 in Figs. 4a,b being 0.4um metal films – col. 5, line 30,thus comprising thin-film).

Claim 10:

The first switching configuration in which the at least one membrane bridges electrically at least one of the gaps (transmission line in/out gap) includes at least one membrane connecting electrically the first gap thereby providing a closed series RF switch configuration (closed position and Fig. 29e, f).

Claim 11:

The first switching configuration in which the at least one membrane bridges electrically at least one of the gaps includes at least one membrane connecting electrically the second gap (e.g. to ground) thereby providing a closed series RF switch configuration (closed connection to ground shown in Figs. 29 e, f).

Claim 12:

A deflectable membrane configured to electrically bridge a gap between conductors (i.e. in/out – Fig. 29 b) formed co-planarly (Fig. 29 d) on a non-conducting substrate (discussed in the reasons for rejection of claim 1 above); and means to deflect the membrane (DC Ctl) in a membrane deflection mode, where the switching device is in a closed position (Fig. 29e, f) where the deflection causes the electrical bridging of the gap and where the switching device is in an open position when the deflection keeps the membrane apart from the gap (analogous to Figs. 8a, b).

Claim 13:

Where the electromagnetic radiation is RF radiation (analogous to Figs. 8a, b showing capacitive coupling).

Claim 14:

Where the membrane and the substrate are parallel to each other and where the deflection is perpendicular to the substrate (analogous to Figs. 8a, b; where the up/down or y-axis deflection of the membrane is orthogonal to the substrate).

Claim 16:

Where the RF conductors (in/out – Fig. 29b) include two RF traces separated by a first gap, the electrical bridging including electrically shorting the RF traces across the first gap (Figs. 29e, f with respect to Figs. 8a, b).

Claim 17:

Where the RF conductors include at least one RF trace (in/out) and at least one ground trace (2940, 2941), the at least one RF and ground traces separated by a second gap (Fig. 29b-f), where the electrical bridging includes electrically shorting at least one RF and ground traces across the second gap (Fig. 29e).

Claim 18:

Where the membrane is made of conducting silicon (discussed in the reasons for rejection of claims 4 and 5 above).

Claim 19:

Where the is made of a non-conducting material (Si nitride – discussed in the reasons for rejection of claims 4 and 5 above), the switching device further comprising a conductive thin-film bridge disposed on the membrane facing the substrate, where metal plate 1014 shown in Fig. 10 faces the substrate and is disposed on membrane 1012 and is analogous to 415 shown in Fig. 4b comprising a conductive thin film, discussed in the reasons for rejection of claims 4 – 6 above).

Claim 21:

Further comprising an additional stretching mechanism attached to the membrane (415/414 – Fig. 4b), the stretching mechanism operative to change a stretching condition of the membrane thereby assisting in obtaining the membrane

deflection mode (where metal film 415/414 and membrane 412 provides a tradeoff between electrode threshold voltage and restoring force – col. 5, lines 45-48).

Claim 22:

A method for obtaining rapid electromagnetic wave switching using a MEMS device (where the method and steps therein are generic defining or defined by the final product, thus the final product of Goldsmith et al. inherently defining or defined by a method; where rapid switching is taught – col. 5, line 49) comprising the steps of providing a deflectable membrane configured to electrically bridge a gap between electrical conductors formed co-planarly on a non-conducting substrate (Figs. 29b-d); and deflecting the membrane in a membrane deflection mode to bring the membrane to a closed switching position defined by an electrical bridging of the gap, and to bring the membrane to an open switching position in which the membrane is kept apart from the gap (analogous to Figs. 8a, b).

Claim 23:

Where the electromagnetic radiation is RF radiation (analogous to Figs. 8a, b showing capacitive coupling, discussed in the reasons for rejection of claim 13 above) and where the electrical conductors (in/out) are RF traces (e.g. microstrips – Fig. 29b; further exemplified by col. 1, lines 12-18 and col. 19, lines 7-25).

Claims 1 – 3, 6, 7, 10 – 13, 15 – 17, and 20 – 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Kong et al. (U.S. Patent No. 6,218,911).

Claim 1:

Kong et al. (best shown in Fig. 5d) shows an RF switch comprising a non-conducting substrate (22, GaAs – Fig. 1) having two RF traces separated by a first gap (out 1 or out 2 each separated by a gap), and at least one ground trace (75) coplanar with the RF traces (i.e. on the substrate) and separated from the RF traces by a second gap (where the spacing between ground 75 and RF out 1 or RF out 2 comprises the second gap); at least one membrane (air bridge 24) positioned in parallel (to out 1 or out 2) and connected with the substrate (thru traces on the substrate), the at least one membrane configured to electrically bridge across at least one on the gaps, the membrane deflectable in a membrane mode (shown in Figs. 5d); and an electrical mechanism (DC Control 1 or 2) for moving the at least one membrane between two switching configurations (RF out 1 or RF out 2), a first switching configuration in which the at least one membrane bridges electrically at least one of the gaps (i.e. between RF out 1 or RF out 2) and a second switching configuration which the at least one membrane leaves each of the gaps electrically open (e.g. opposite RF out contact).

Claim 2:

Where the configuration of the at least one membrane to electrically bridge is effected by the membrane being electrically conductive (applied DC voltage to contact RF out).

Claim 3:

Where the configuration of the at least one membrane to electrically bridge is effected by the membrane having disposed a conductive bridge (metal beam 24 connecting RF in and out; further inherent by the applied DC voltage).

Claim 6:

Where the electrical mechanism includes thin-film electrodes (col. 4, lines 8-41 and in particular lines 33-37 with respect to Figs. 4a-4f; where the metal layer 64 deposited on the photoresist, where the photoresist and excess metal is subsequently removed, and where metal layer comprising electrodes and membrane comprises a thickness of two microns, thus inherently thin-film) operative to interact electrostatically to move the membrane in the deflection mode (Fig. 5d).

Claim 7:

Where the thin film electrodes includes at least one set of bottom electrodes (80, 82, 84, 86 – Fig. 5d) substantially aligned in a direction perpendicular to the substrate (analogous to Figs. 4g and 4h).

Claim 10:

The first switching configuration in which the at least one membrane bridges electrically at least one of the gaps (RF out) includes at least one membrane connecting electrically the first gap thereby providing a closed series RF switch configuration (closed position – Fig. 5b).

Claim 11:

The first switching configuration in which the at least one membrane bridges electrically at least one of the gaps includes at least one membrane connecting electrically the second gap (e.g. to ground) thereby providing a closed series RF switch configuration (closed connection to ground – Fig. 5c).

Claim 12:

A deflectable membrane configured to electrically bridge a gap between conductors (RF in/out – Fig. 5a or RF out 1, 2 – Fig. 5d) formed co-planarly (where the traces are formed on the substrate – Fig. 5d) on a non-conducting substrate (discussed in the reasons for rejection of claim 1 above); and means to deflect the membrane (DC Control) in a membrane deflection mode, where the switching device is in a closed position (Figs. 5b-d) where the deflection causes the electrical bridging of the gap and where the switching device is in an open position when the deflection keeps the membrane apart from the gap.

Claim 13:

Where the electromagnetic radiation is RF radiation (i.e. capacitive coupling – col. 3, lines 28-62).

Claim 15:

Where the membrane and the substrate are perpendicular to each other and where the deflection is parallel to the substrate (where the face of the membrane is defined a perpendicular to the substrate and the sideways or x-axis deflection of the membrane is parallel to the substrate).

Claim 16:

Where the RF conductors include two RF traces (RF in and RF out 1 or 2 – Fig. 5d) separated by a first gap, the electrical bridging including electrically shorting the RF traces across the first gap (Fig. 5d).

Claim 17:

Where the RF conductors include at least one RF trace (in/out) and at least one ground trace (75), the at least one RF and ground traces separated by a second gap (discussed in the reasons for rejection of claim 1 above), where the electrical bridging includes electrically shorting at least one RF and ground traces across the second gap (Fig. 5c).

Claim 20:

Where the RF conductors and RF traces (RF in/out) that further include sections perpendicular to the substrate (where faces of conductors 26, 28 shown in Fig. 4g, h are perpendicular to the substrate) and separated by a gap identical to the first gap (where Fig. 5d shows plural conductors spaced by the same gap), each of the sections having a flat plane parallel to the membrane (shown in Fig. 4g,h where the faces of 26, 28 are parallel to 24), the parallel deflection of the membrane (Figs. 5b-d) effecting an electrical bridging of the RF traces across the perpendicular gap in the closed position.

Claim 21:

Further comprising an additional stretching mechanism attached to the membrane (wider and narrower regions – Figs. 7a, b), the stretching mechanism operative to change a stretching condition of the membrane thereby assisting in obtaining the membrane deflection mode (col. 6, lines 4-14).

Claim 22:

A method for obtaining rapid electromagnetic wave switching using a MEMS device (where the method and steps therein are generic defining or defined by the final product, thus the final product of Kong et al. inherently defining or defined by a method;

where the term "rapid switching" is an open term, the range or speed not defined by the claim, thus where the switching of Kong et al. inherently provides "rapid switching"; further where Kong et al. teaches reductions of sticking problems – col. 3, lines 60-62 further exemplifying "rapid switching") comprising the steps of providing a deflectable membrane configured to electrically bridge a gap between electrical conductors formed co-planarly on a non-conducting substrate (Figs. 5b-d); and deflecting the membrane in a membrane deflection mode to bring the membrane to a closed switching position defined by an electrical bridging of the gap, and to bring the membrane to an open switching position in which the membrane is kept apart from the gap.

Claim 23:

Where the electromagnetic radiation is RF radiation (discussed in the reasons for rejection of claim 13 above) and where the electrical conductors (RF in/out) are RF traces (Fig. 5d).

Allowable Subject Matter

Claims 8 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hopcroft – shows an RF MEMS switch.

Kudrle et al. – shows an RF MEMS switch.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dean O. Takaoka whose telephone number is (571) 272-1772. The examiner can normally be reached on 8:30a - 5:00p Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on (571) 272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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February 25, 2005